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11.27.02

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Burke et al.
Serial No.: 09/100,569
Filed: June 19, 1998

For: Method And Apparatus For Desensitization Of A Wireless Receiver

Group Art Unit: 2634
Examiner: S. Liu
Attorney Docket: Burke 2-1-3-2-13

John de la Rosa
375 Upper Mountain Avenue
Montclair, NJ 087043

DECLARATION UNDER 37 CFR 1.131

Honorable Commissioner of Patents and Trademarks
Washington D.C. 20231

I co-inventor Leonard Edward O'Boyle whose application for Letters Patent For "Method and Apparatus For Desensitization Of A Wireless Receiver," Serial No. 09/100,569 was filed June 19, 1998 in the United States Patent and Trademark Office, declare that:

1. At the time the invention as defined in amended claims 1-17 was made, I was employed by Lucent Technologies, Inc., Murray Hill, NJ;

2. Prior to December 23, 1977, I co-authored a description of the invention defining the scope of amended claims 1-17 in a document entitled "Methods and Apparatuses to Implement

Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver";

3. A true copy of the original of the document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver" is appended hereto and marked as Exhibit A with exhibit pagination appropriately supplied in the center on the top of each page of the exhibit;

4. The document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver" corresponds to a description of a method for desensitizing a CDMA receiver by injecting noise into the receive path so as to bring the noise up to the signal;

5. The method disclosed in this latter document includes a) using a broadband noise source such as noise diode or b) using a CW source for desensitization; or c) using modulated CW source as the noise source;

6. The method disclosed in the Document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver" describes the underlying basis and operation of the invention defined in amended claims 1-17 of the present application;

7. Figures 1-6 of the Document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence

Spread Spectrum CDMA Receiver" correspond to original Figures 1-6 of the application, except for the numerals. The figure labeled "Attenuator Modulated Signal Injection" is incorrectly numbered Figure 5, and should have been numbered Figure 6. Also, a portion of the spread spectrum receiver denoted by numerals 35, 45 in the presented application is not shown in the Figures of the Document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver," but is supported by the description thereof;

8. The basis for Figures 7a and 7b of the present application is in the last paragraph of the Document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver";

9. Prior to December 23, 1997 and on information and belief, Lucent Technologies' managing attorney Julio A. Garceran, who was responsible for reviewing the Document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver," prepared a Submission Information Document for the above invention;

10. A true copy of the Submission Information Document is appended hereto, and marked as Exhibit B;

11. On information and belief, the Submission Information Document is a document prepared in the ordinary course of business by Lucent Technologies;

12. The invention described in the Document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver" was assigned Invention Disclosure Submission (IDS) No. 113850 for patentability consideration by Lucent Technologies' managing attorney Julio A. Garceran prior to December 23, 1997;

14. The blocked-out portions at the top center of page B-1 ("Status Date", and "Open Date") of the Submission Information Document Exhibit B corresponds to dates prior to December 23, 1997;

15. From a date just prior to December 23, 1997, I along with the other named co-inventors diligently worked with Lucent Technologies' managing attorney Julio A. Garceran in preparing a patent application describing the invention disclosed in the Document entitled "Methods and Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver";

16. In working with Lucent Technologies' managing attorney Julio A. Garceran, I along with the other named co-inventors reviewed draft versions for the invention as defined in the claims and forwarded comments and corrections to the managing attorney;

17. Less than six months later, and on June 6, 1998 a patent application for the invention entitled "Method and Apparatus For Desensitization Of A Wireless Receiver" was filed with the

United States Patent and Trademark Office, receiving U.S. serial no. 09/100,569.

18. In accordance with paragraphs 1 through 17, prior to December 23, 1997 the invention as defined in amended claims 1-17 of the above-identified application was conceived and completed in the United States of America;

19. I declare further that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that all such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 11/18/02

Leonard E O'Boyle

Leonard Edward O'Boyle

Exhibit A

Methods & Apparatuses to Implement Desensitization for a Direct Sequence Spread Spectrum CDMA Receiver

Michael E. Burke	x63929	WH 8E-011
Joseph Lipowski	x94430	WH 8C-055
Len O'Boyle	x66686	WH 2F-204
Rulon Vandyke	x67855	WH 4E-330
Jack Wen	x64139	WH 8E-014

The inventions, shown in the attached figure, are methods to implement desensitization of a spread spectrum CDMA receiver. In cellular applications, reduced sensitivity may be desired of a CDMA receiver in applications where the coverage area is small or the coverage area is embedded within a larger cell. In these applications, the receiver does not need the high sensitivity due to the lower forward link power transmitted by the cell. With lower transmitted power, the receiver needs to be desensitized to balance the link between forward and reverse paths. Desensitization is also important for handoff situations between small desensitized cells and other large cells. The receivers of both cells in handoff need to have their sensitivities balanced at the handoff boundary. If the smaller cell had greater sensitivity than the larger cell, the mobile unit will transmit a low level of power to satisfy the small cell but the power level will be insufficient to reach the large cell. This is most critical at the handoff boundary. It is therefore, necessary to desensitize the small cell so that the mobile transmitted power level at the handoff boundary is sufficiently high to both the small cell as well as to the large cell.

The means to implement desensitization in prior art (Figure 1) is to insert an attenuator or other lossy device prior to the input of the low noise amplifier (LNA) of a receiver. The attenuator can be an adjustable unit to provide variable desensitization levels. However, the disadvantage with this implementation is that variable attenuators still incur a small loss even at the "zero" loss setting of the attenuators. This small loss can be as much as a few dB and may sometimes be a significant contributor to the overall noise figure of the receiver. Therefore, in order to circumvent this dilemma, the inventions focuses on implementations after the LNA for the very minimal and negligible contribution to the overall receiver noise figure. Another significant advantage of the inventions is that a coupler is the only device used in the line of the receive path. The very low insertion loss (0.5 dB) of the coupler after the LNA has essentially no contribution to the overall noise figure. Other devices can be used such as power combiners. However, they incur greater loss and thus have greater contribution to the overall noise figure.

The first implementation consist of utilizing a broadband noise source such as a noise diode to inject into the receive path as shown in Figure 2. The variable attenuator provides the ability to adjust the amount of noise power to be injected into the receive path thus providing different levels of desensitization. However, the amount of noise power must be equal to or greater than the cumulative gain of the components preceding the coupler before any desensitization can be realized. This implementation has the same effect as the prior art but instead of attenuating the signal down to the noise, it brings the noise up to the signal.

In Figure 3, the method is the same as the first implementation but instead of a noise source, it uses a CW signal source for desensitization. Again, the amount of signal being injected into the receive path will provide a

corresponding amount of desensitization. This is possible only for spread spectrum systems because of their inherent property to frequency spread interferers while the system is despreading its desired spread spectrum signal. In this case, the CW source appear like an interferer to the spread spectrum system. When the interferer is spread, the resulting signal appears to be like noise in the presence of the desired despread signal. The higher the interfering CW signal power, the higher its spreaded "noise" power. With this effect, varying levels of desensitization can be realized by adjusting the injected CW signal level.

The third method is the same as the second method, however, the CW source is modulated to provide a wider bandwidth interference signal compared to the narrow CW signal. Means to implement the modulator can be a I/Q modulator, mixer, or a variable attenuator as shown in Figure 4, 5, and 6 respectively. The types of modulation can be AM, FM, PM, noise or any other form of modulation of the frequency source including combinations of the aforementioned types. Additionally, noise type modulation can also be implemented by using digital pseudo-random sequences. As described previously, the modulated signal will appear to be like an interferer and will go through the same process of being despread and appearing like "noise". Similarly, the amount of desensitization will be proportional to the amount of injected power of the modulated source. A wider bandwidth desensitization signal may be desired in certain applications where narrow bandwidth signals may pose a problem for devices making RSSI measurements.

Although the figures show implementations at the RF stage, all of the above methods can also be implemented at the IF or baseband stages. Particularly for baseband implementations, that is, after digitization of the I/Q signal, noise desensitization can be implemented by means of summing together a digital pseudo-random sequences with the digitized I/Q signal.

Figure 4
I/Q Modulated Signal Injection

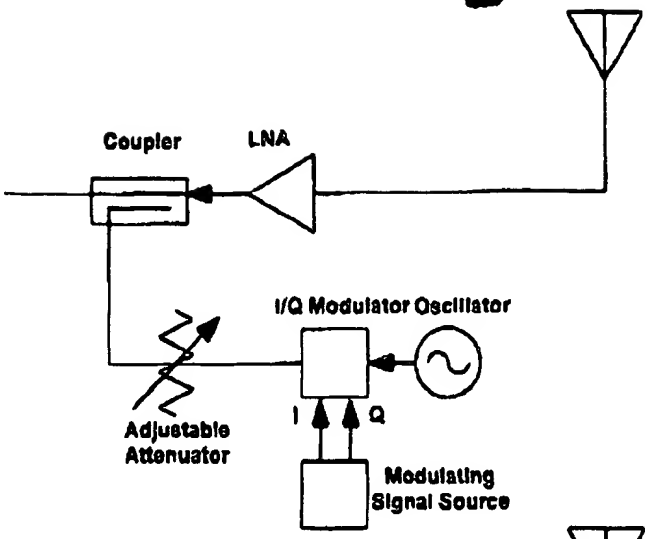

Figure 5
Mixer Modulated Signal Injection

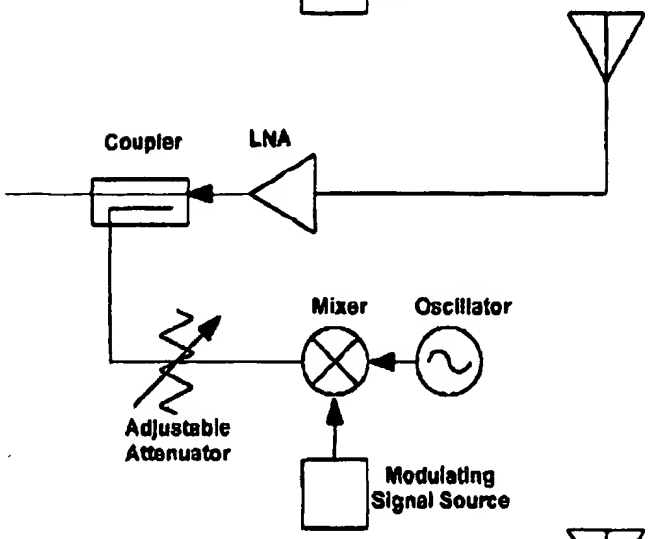

Figure 5
Attenuator Modulated Signal Injection

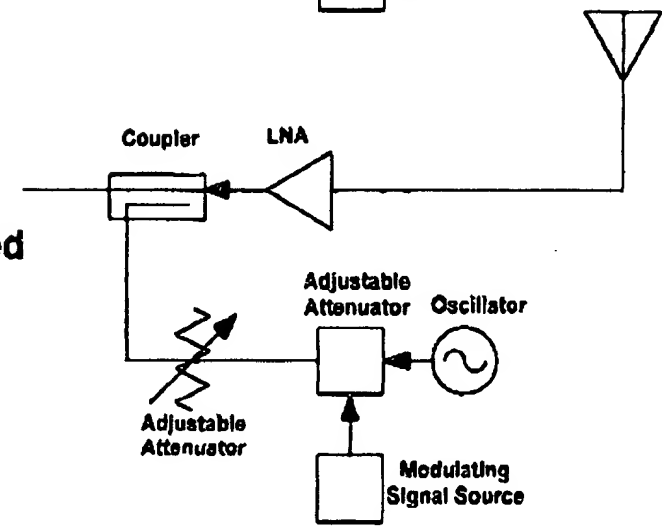

Figure 1
Prior Art

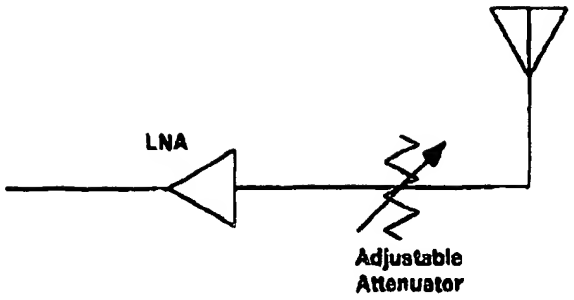

Figure 2
Broadband
Noise Injection

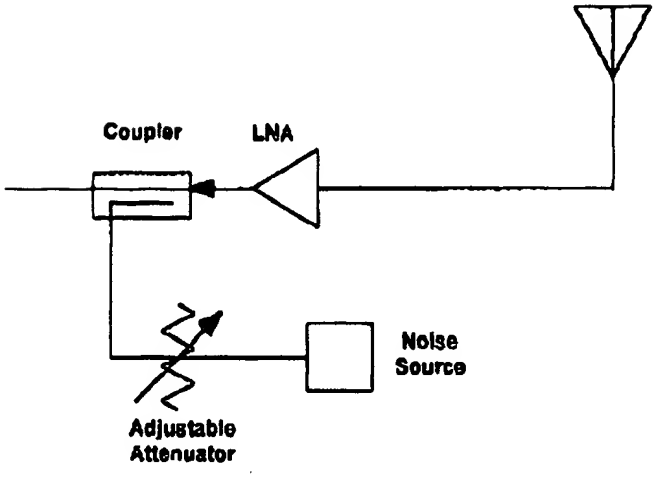

Figure 3
CW Signal Injection

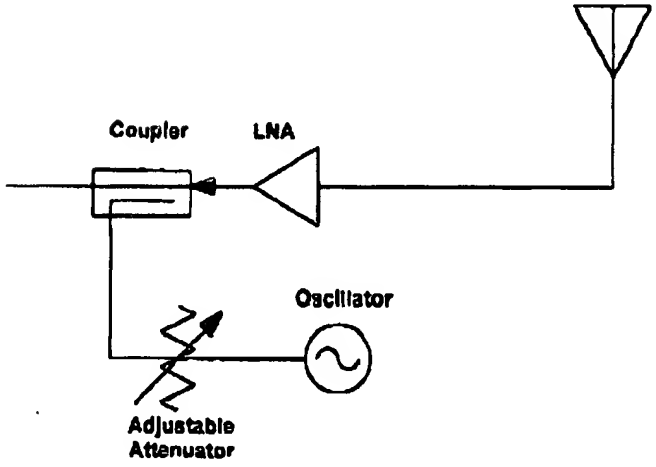

EXHIBIT B

SUBMISSION NO. : 113 , 113850

ATTORNEY : Garceran, Julio A.

Title :
Methods And Apparatus To Implement Desensitization For A Direct Sequence Spread CDMA Receiver

----------MAIN INFORMATION----------

ITEM STATUS	: Opened	AT&T RATING	:
STATUS DATE	: [redacted]	NON AT&T RATING	:
OPEN DATE	:	PATENT WPN	: U0
CLOSE DATE	:	GOVT. CONTRACT	: No
DEADLINE DATE	:	TYPE	: Patentability
BU CODE(S)	: NSWLS	DEFENSIVE	: No

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Brief Description :

No data in this field